CLAIMS

What is claimed is:

1. An air-driven microfluid control device, which is applied for pulling and pushing a fluid inside a fluid tunnel, comprising:

an air source, which provides an airflow;

a first inlet, which connects to the air source for guiding the airflow;

a narrow sector, which connects to the first inlet and connects from its side to the fluid tunnel;

an outlet, which connects to the narrow sector so that the airflow from the first inlet goes through the narrow sector and leaves via the outlet; and

a second inlet, which connects to the fluid tunnel so that the airflow from the second inlet enters the fluid tunnel to generate a pushing force;

wherein a negative pressure lower than the external pressure is produced in the narrow sector to pull the fluid into the fluid tunnel when the first inlet provides an airflow while the second inlet is closed, and a positive pressure greater than the external pressure is produced in the narrow sector to push the fluid away from the fluid tunnel when the first inlet is closed while the second inlet provides an airflow.

2. The air-driven microfluid control device of claim 1, wherein the second inlet is a curved airflow channel.

3. The air-driven microfluid control device of claim 1, wherein the air source is an air compressor.

4. The air-driven microfluid control device of claim 1, wherein the second inlet

connects to the narrow sector and is in fluid communications with the fluid tunnel.

5. The air-driven microfluid control device of claim 1 further comprising a control system to control the airflow from the air source into the first inlet and the second inlet.

6. The air-driven microfluid control device of claim 5, wherein the control system includes a pressure adjuster and an electronic signal control interface.

7. An air-driven microfluid control method, which is applied for pulling and pushing a fluid inside a fluid tunnel, comprising the steps of:

providing a first airflow channel, which includes a first inlet, a narrow sector, and an outlet, wherein the first inlet connects to the narrow sector, the narrow sector then connects to the outlet, and the fluid tunnel connects to the narrow sector from its side;

providing a second airflow channel, which includes a second inlet connecting to the fluid tunnel for the airflow from the second inlet to enter the fluid tunnel;

providing an air source, which connects to the first inlet and the second inlet for providing air;

providing air at the first inlet to generate a first airflow and closing the second inlet, the first airflow producing a negative pressure smaller than the external pressure when passing through the narrow sector, pulling the fluid into the fluid tunnel; and

providing air at the second inlet to generate a second airflow and closing the first inlet, the second airflow producing a positive pressure greater than the external pressure when passing through the narrow sector, pushing the fluid away from the fluid tunnel.

8. The method of claim 7, wherein the second inlet is a curved airflow channel.

9. The method of claim 7, wherein the air source is an air compressor.

10. The method of claim 7, wherein the second inlet connects to the narrow sector and is in fluid communications with the fluid tunnel.

11. The method of claim 7 further comprising a control system to control the airflow from the air source into the first inlet and the second inlet.

12. The method of claim 11, wherein the control system includes a pressure adjuster and an electronic signal control interface.

13. An air-driven microfluid control device, which connects to a fluid tunnel of a fluid chip for pulling and pushing a fluid inside the fluid tunnel, comprising:

a first airflow channel, which includes a first inlet, a narrow sector, and an outlet, wherein the first inlet has a diameter gradually shrinking to that of the narrow sector and connects to the narrow sector, the narrow sector then connects to the outlet, the fluid tunnel connects to the narrow sector from its side, and the airflow from the first inlet goes through the narrow sector and leaves via the outlet;

a second airflow channel, which includes a second inlet, wherein the second airflow channel is in communications with the fluid tunnel via the first airflow channel for the airflow from the second inlet to enter the fluid tunnel; and

an air source, which connects to the first inlet and the second inlet, respectively, for providing airflows;

wherein a negative pressure lower than the external pressure is produced in the narrow sector to pull the fluid into the fluid tunnel when the first inlet provides an airflow while the second inlet is closed, and a positive pressure greater than the external pressure is produced in the narrow sector to push the fluid away from the fluid tunnel when the first inlet is closed while the second inlet provides

an airflow.

14. The air-driven microfluid control device of claim 13, wherein the second inlet is a curved airflow channel.

15. The air-driven microfluid control device of claim 13, wherein the air source is an air compressor.

16. The air-driven microfluid control device of claim 13, wherein the second inlet connects to the narrow sector and is in fluid communications with the fluid tunnel.

17. The air-driven microfluid control device of claim 13 further comprising a control system to control the airflow from the air source into the first inlet and the second inlet.

18. The air-driven microfluid control device of claim 17, wherein the control system includes a pressure adjuster and an electronic signal control interface.